IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of	:	Sparks, Adrian
Serial No.	:	09/745,890
Filed	:	December 21, 2000
For	:	Load Sharing Nodes in a Network Utilising Shared Optical Protection
Examiner	:	Tran, Dzung D
Art Unit	:	2613
Customer number	:	23644
Confirmation No.	:	1275

BRIEF ON APPEAL

Honorable Director of Patents and Trademarks
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the Examiner's final rejection of July 13, 2006 and the advisory action of December 21, 2006 in which all pending claims, that is claims 1 to 8, were rejected. An appropriate response was filed on November 29, 2006, and a timely Notice of Appeal was e-filed on January 16, 2007 with the required fee of $500 and necessary extension fee.

The brief fee of $500 pursuant to 37 C. F. R. §41.20(b) should be deducted from Deposit Account No. 12-0913.

(i) Real Party in Interest

This application is assigned to Nortel Networks Limited, who is the real party in interest.

(ii) Related Appeals and Interferences

There are no related appeals or interferences or judicial proceedings.

(iii) Status of Claims

This application was filed with claims 1 to 8.

Claims 1 to 8 have been finally rejected by the Examiner. The final rejection of these claims in the office action of July 13, 2006 is appealed. Claims 1 to 8 as amended during the prosecution of the application, are set out in the Claims Appendix.

(iv) Status of Amendments

The final action was mailed on July 13, 2006. Arguments were presented, but no amendments were made, in the response of November 29, 2006, which was not entered, for no discernible or defensible reason.

(v) Summary of Claimed Subject Matter

The present invention relates generally to optical communications systems. Such systems often have a protection scheme to reroute communications traffic in case of a failure somewhere along an original path, called the working path. As such schemes involve providing alternative paths, called protection paths, they reduce the bandwidth or capacity of the network. If protection paths were provided for every working path, this would halve the

network capacity. Where the protection paths are rarely used, it is known to provide fewer protection paths, which are shared between the working paths.

It is known that the rerouting of traffic to the protection path can either be carried out by routers at nodes of the network, or for an individual link between nodes, a protection path and dedicated switches can be provided, without using the routers. This is typically much more expensive, but faster than using the routers. Another problem with routers is that rerouting means that each router table will require updating. This takes a finite time to be initiated and to propagate through the network to routing tables at other nodes. Routing table updates are best avoided if possible. They consume router processing resources and can trigger routing instability or "route flapping".

The present invention addresses this problem, by using a link aggregated router having a first port for the working path and a second port for the shared protection path, both paths normally carrying link aggregated traffic. Link aggregation involves grouping physical link segments of the same media type and speed, and treating them as if they were part of a single, logical link segment (see line 24 of page 4 to line 21 of page 5 in particular). A link aggregation router is a load sharing device, so a failure in one or more of the physical links of the group of links, can be perceived by the router as a change in available bandwidth rather than a change in connectivity. The change in available bandwidth triggers a dynamic reassignment of the link aggregated traffic on the grouped links. Provided capacity is available on at least one link of the grouped links connected to either of the load sharing ports, the router will not see change in its connectivity. Thus, in this case, router tables need not be updated, and the problem condition of "route flapping" is inhibited from occurring.

Independent claim 1 specifies:

A network node (A,B,C,D in fig 3 and 4 and lines 22-27 of page 5) for an optical communications shared protection scheme network, the network node

being arranged to provide optical signals to at least two transmission paths (212ab, 214ab, 212cd, 214cd in figs 3 and 4 and lines 22-27 of page 5), the node comprising a link aggregation router (210a, 210b, 210c, 210d in figs 3 and 4 and lines 22 of page 5 to line 9 of page 6, and lines 6-15 of page 5) having at least two ports (216a, 216b, 216c, 216d in figs 3 and 4 and lines 22-27 of page 5), a first port (216a, 216b, 216c, 216d in figs 3 and 4 and lines 22-27 of page 5) connected to a working transmission path (212ab, 212cd, in figs 3 and 4 and lines 22-27 of page 5), and a second port (216a, 216b, 216c, 216d and lines 22-27 of page 5) connected to a shared protection path (214ab, 214cd in figs 3 and 4 and lines 22-27 of page 5), such that in failure-free operation both the working transmission path and the shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes (line 26 of page 5 to line 9 of page 6).

Independent claim 3 specifies:

An optical network (figs 3 or 4) comprising a plurality of network nodes (A,B,C,D in fig 3 and 4 and lines 22-27 of page 5), each network node being arranged to provide optical signals to at least two transmission paths (212ab, 214ab, 212cd, 214cd in figs 3 and 4 and lines 22-27 of page 5), the node comprising a link aggregation router (210a, 210b, 210c, 210d in figs 3 and 4 and lines 22 of page 5 to line 9 of page 6, and lines 6-15 of page 5) having at least two ports(216a, 216b, 216c, 216d in figs 3 and 4 and lines 22-27 of page 5), a first port connected to a working transmission path (212ab, 212cd, in figs 3 and 4 and lines 22-27 of page 5), and a second port (216a, 216b, 216c, 216d and lines 22-27 of page 5) connected to a shared protection path such that in failure-free operation both the working transmission path and the shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes (line 26 of page 5 to line 9 of page 6).

Independent claim 4 specifies:

A method of transmitting packet traffic between first and second network nodes (A,B,C,D in fig 3 and 4 and lines 22-27 of page 5) in a shared protection optical transmission network (figs 3 or 4), the method comprising defining first and second traffic paths (212ab, 214ab, 212cd, 214cd in figs 3 and 4 and lines 22-27 of page 5) between said nodes, said first path being a shared protection path (214ab, 214cd in figs 3 and 4 and lines 22-27 of page 5), and said second path being a working transmission path (212ab, 212cd, in figs 3 and 4 and lines 22-27 of page 5), and allocating traffic along said paths utilising link aggregation (lines 22 of page 5 to line 9 of page 6, and lines 6-15 of page 5) such that in failure-free operation both the working transmission path and the shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes (line 26 of page 5 to line 9 of page 6).

(vi) Grounds of Rejection to be Reviewed on Appeal

There is just one ground of rejection. Claims 1 to 8 have been rejected under 35 U.S.C. §102(e) as unpatentable over US patent no. 6,654,341, Chi et al.

(vii) Argument

In summary, the rejections of all claims rely on the Examiner interpreting the claimed link aggregation router as somehow encompassing SONET multiplexing of multiple OC-12 lines onto a single OC-48 line. This cannot be the "broadest reasonable interpretation" of the claim features, as has been explained in previous responses, and in a telephone interview carried out with the Examiner.

In the last advisory action, following the telephone interview, the Examiner argued that the definition of link aggregation is not set out in the claims. This definition is set out explicitly in the specification, and it is well established in case law that the broadest reasonable interpretation of the claims cannot be

inconsistent with such an explicit definition in the specification. The Examiner has not tried to argue that the disclosure of Chi falls within the given definition of link aggregation, so the point of disagreement seems to be whether this definition can be ignored when interpreting the claims. The Examiner's interpretation appears to clearly be contrary to the requirements of MPEP §2111, and ignoring the definition is in error.

The term "link aggregation", and why it cannot be interpreted so broadly as to encompass the switches used in fig 7 of Chi to multiplex OC-12 lines into a single OC-48 line, will be explained in more detail below. This leads inevitably to the conclusion that claim 1 cannot be anticipated by nor obvious over Chi.

Link aggregation appears twice in claim 1, firstly to specify that the node has a link aggregation router connected to two paths, one of which is a shared protection path, and secondly to specify that link aggregated traffic is carried simultaneously on both paths without duplication, when in failure free operation.

As the Examiner has noted, Chi shows a shared protection line 605 in fig 6, and shows sharing the protection line between different SONET rings, by allocating different time slots to different rings. Different parts of the ring may be made up of multiple OC-12 lines or a single OC-48 as shown in fig 7, so switches in the ring can have a SONET multiplex function or SONET de-multiplex function to connect a span of OC-12 lines to a span of OC-48.

This is only relevant to claim 1 if the switches of Chi can be regarded as link aggregation routers and if both working and protection paths carry link aggregated traffic. Link aggregation is a well known term which is defined in the specification as follows:

> "Link aggregation is a method of grouping physical link segments of the same media type and speed, and treating them as if they were part of a single, logical link segment." (page 5 line 6)

This definition continues with the explanation that

> "If a link in a trunk fails, the flows mapped to that link are dynamically reassigned to the remaining links of the aggregated link." (page 5 line 12)

The Examiner seemed to acknowledge in the telephone interview that the broadest reasonable interpretation of the claim cannot ignore such an explicit definition in the specification. The definition follows the established use of the phrase and so merely reinforces the interpretation that a skilled person would use anyway. The Examiner has not tried to argue that the definition is unusual or inconsistent with normal usage but has, instead, simply ignored it.

The SONET switches of Chi are multiplex/ demultiplex switches, which is not the same as link aggregation as defined here. The SONET multiplex switches do not "group physical physical link segments of the same type and treat them as if they were a single logical link segment". The SONET multiplex switches do take the signals from multiple OC-12 lines of one span and convert them into OC-48 for transmission in the next span. This is not link aggregation. The concept of link aggregation is not the same as the concept of multiplexing lines of one span into a multiplexed second span. Link aggregation would correspond to treating the span of OC-12 lines as an OC-48 span, with dynamic allocation of flows between the OC-12 lines, if this were possible. This is not possible in SONET, as is well known to those skilled in the art. Hence it is apparent that link aggregation is a fundamentally different concept to multiplexing as used in SONET, and is not interchangeable. Chi does not do this link aggregation nor hint at it.

The shared protection path in Chi does involve reallocation of traffic in the event of a failure, but this reallocation does not meet the definition of link aggregation which is "reallocation to the remaining links of the aggregated link". In Chi, the reallocation is not to the remaining links, but is to an alternative line, the protection line, or at least some of the time slots on that protection line, kept free for this purpose.

Furthermore Chi does not show the second mention of link aggregation in claim 1, the link aggregated traffic being carried on both the working path and the shared protection path, during failure-free operation. Chi does not discuss what is carried on the shared protection path during failure-free operation, but even if it implied that some SONET multiplexed traffic were carried, this is not link aggregated traffic as defined above. Such link aggregated traffic is flows which are mapped to a group of physical link segments of the same media type and speed, treated as if they were part of a single, logical link segment, and dynamically reassigned between the links in the event of failure.

Applying the multiplexing of Chi without dynamic reassignment, does not solve the problem set out in the specification at page 3, of routing instability, as discussed in the summary of the claimed subject matter section above. Hence, if the claimed link aggregation router were to be interpreted as the Examiner proposes, as encompassing multiplexing without dynamic reassignment, the claim would not achieve the advantage stated in the description at page lines 7 to 9 of the router not seeing "a change in its connectivity, thus avoiding routing table changes which take time to signal and can result in network instabilities." Thus if the given definition of link aggregation is ignored, the claim still does not achieve the stated advantage. This confirms that the Examiner's proposed interpretation is completely inconsistent with the specification and therefore it cannot be the "broadest reasonable interpretation" of the claim.

For these reasons, Chi cannot anticipate claim 1.

Regarding obviousness, given the explanation above of the fundamental distinction between link aggregation and SONET multiplexing, it should be apparent that these two techniques are not interchangeable since, they serve completely different purposes. Hence there is no incentive for a skilled

person to alter the SONET multiplexing with shared optical protection of Chi to reach the present invention. As explained in previous responses, optical protection schemes would normally be handled at the link level and thus operate independently of any link aggregation router. Hence there is nothing in Chi which leads towards the unusual step of incorporating a link aggregation router into an optical shared protection scheme as set out in the present claim 1. Nor is there any incentive to use the shared protection path for link aggregated traffic. This has the consequence of more efficient use of bandwidth and there is no longer a need to pre sort the traffic for the optical link into protected and unprotected traffic, as the router is capable of doing this. Hence some of the advantages of link aggregation and of shared protection paths can be achieved more efficiently by using the same router for both schemes. There is no suggestion in Chi of this, and no suggestion of using its router to separate traffic between a shared protection path and a working path. Nor is there any hint of the advantages arising. Hence Chi is not relevant to claim 1.

All the other claims have corresponding features or are dependent on such claims, and so these arguments apply to all claims.

This Brief is entirely consistent with arguments in previous responses. Reversal of the Examiner's rejections is respectfully requested.

March 14, 2007

Respectfully submitted,

William M. Lee, Jr.
Registration No. 26,935
Barnes & Thornburg LLP
P.O. Box 2786
Chicago, Illinois 60690-2786
(312) 214-4800
(312) 759-5646 (fax)

Claims Appendix

1. A network node for an optical communications shared protection scheme network, the network node being arranged to provide optical signals to at least two transmission paths, the node comprising a link aggregation router having at least two ports, a first port connected to a working transmission path, and a second port connected to a shared protection path, such that in failure-free operation both the working transmission path and the shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes.

2. A network node as claimed in claim 1, wherein said shared protection path is a ring, said second port being connected to said ring via an optical switching device arranged to switch signals transmitted to and from the second port in either direction around the ring.

3. An optical network comprising a plurality of network nodes, each network node being arranged to provide optical signals to at least two transmission paths, the node comprising a link aggregation router having at least two ports, a first port connected to a working transmission path, and a second port connected to a shared protection path such that in failure-free operation both the working transmission path and the shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes.

4. A method of transmitting packet traffic between first and second network nodes in a shared protection optical transmission network, the method comprising defining first and second traffic paths between said nodes, said first path being a shared protection path, and said second path being a working transmission path, and allocating traffic along said paths utilising link aggregation such that in failure-free operation both the working transmission path and the

shared protection path carry link aggregated traffic simultaneously without duplication of that traffic on the two routes.

5. A method as claimed in claim 4, wherein said shared protection scheme is an optical shared protection ring, and wherein in the event of a failure or degradation of said protection path, the protect path is switched to be the other way around the ring.

6. A method as claimed in claim 4, wherein a failure in a transmission path is perceived by the nodes as a reduction in capacity by said nodes.

7. A computer program arranged to control the transmission of packet traffic in accordance with the method of claim 4.

8. A computer program as claimed in claim 7, the program being stored on a machine readable medium.

Related Proceedings Appendix

None.

Evidence Appendix

None.